ITK Pixel Modules Task List Report
Scrubbing Exercise 6/23/2016

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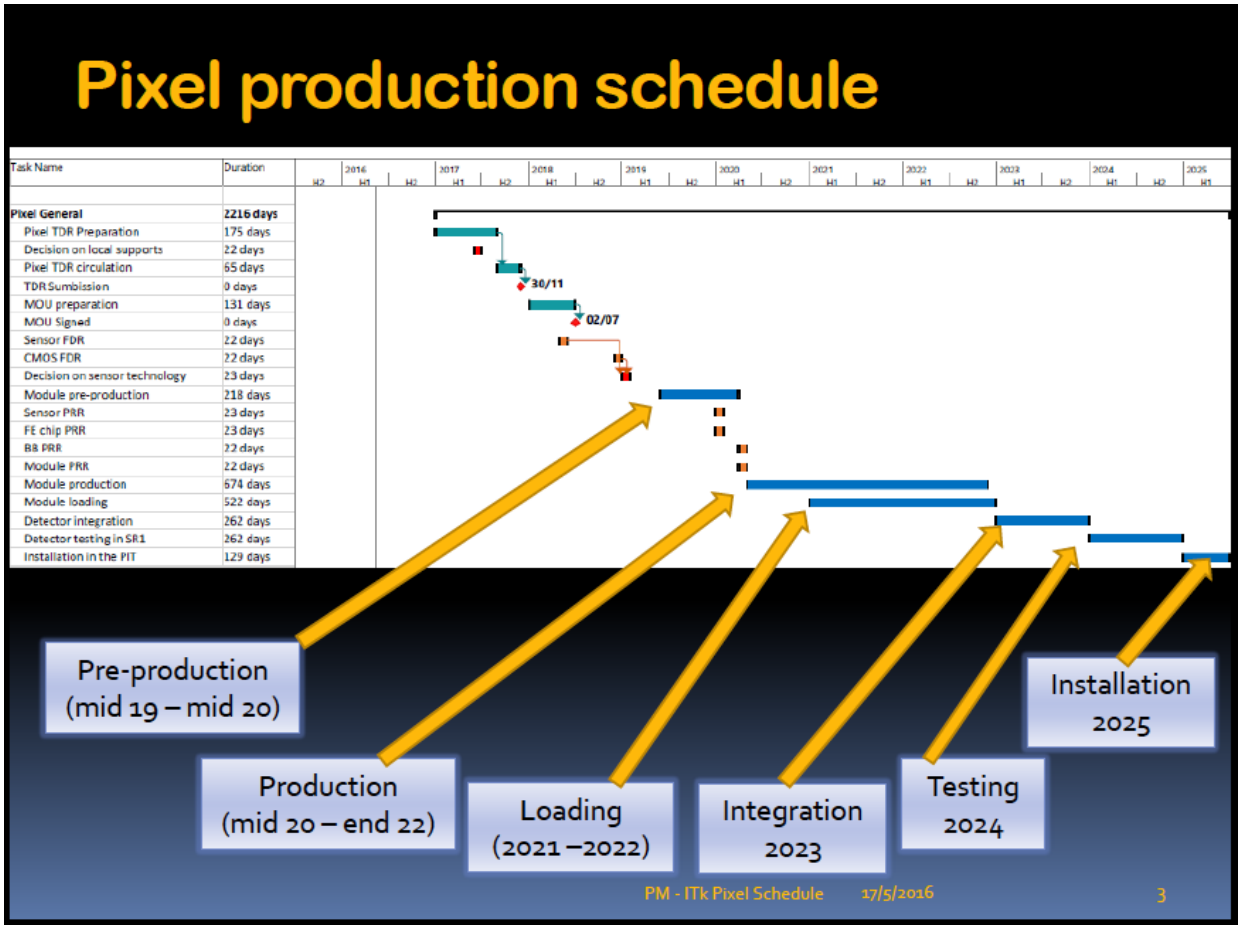
Modules Task List Assumptions

Timeline:



Relevant Milestones:

- FE PDR 12/16 (not listed)
- TDR circulation 10/1/17
- TDR submission 11/30/17
- Sensor FDR 3/1/18
- FE FDR 5/1/18 (not listed)
- Technology decision—FDR 1/1/19
- FE Chip PRR 1/1/20
- Module PRR 3/1/20

Taken from Paolo Morettini's talk
https://indico.cern.ch/event/532083/contributions/2168620/attachments/1273753/1889908/PixelSchedule.pdf

Modules Task List Assumptions

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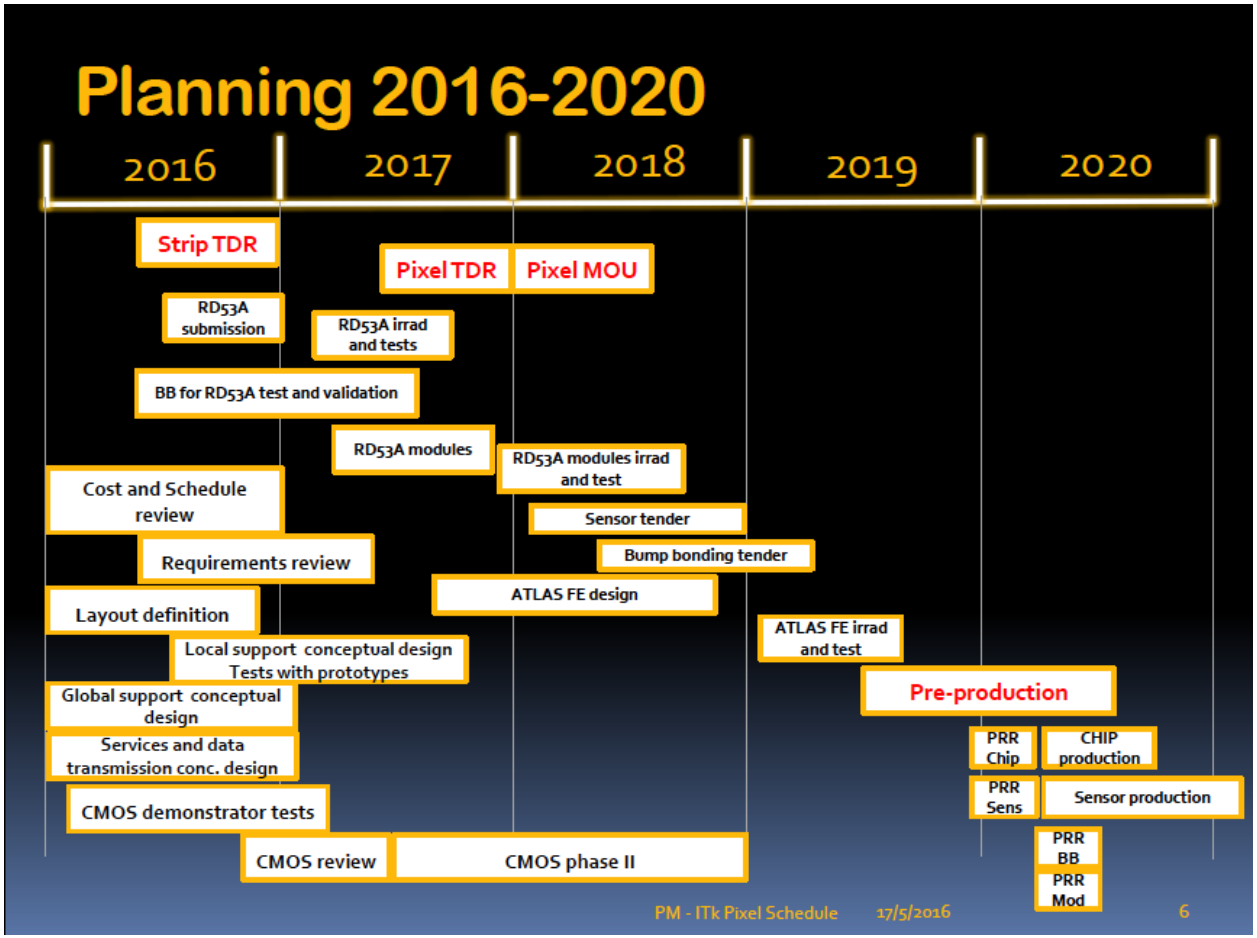

Relevant Milestones:

- FE RD53A submission 3/30/17
- FE RD53A wafers received 6/1/17
- FE RD53A modules distributed 7/1/17
- FE RD53B submission 10/5/18
- FE RD53B wafers received 2/1/19
- FE RD53B modules distributed 4/1/19
- Preproduction 7/1/19
- Production 7/1/20
- End Module Production 9/30/22

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Modules Task List Assumptions

Production Rate Assumptions:

FE Chip

- Estimate 18 m^2 pixels, 60% wafer yield -> 30 m^2
- ~0.07 m^2 / wafer => 428 wafers total for ATLAS
- Wafer testing: 3 sites ATLAS wide
- 140 wafers tested at LBNL
- Production wafer testing: 3/1/20 to 9/1/21
- 8 wafers / week

- Purchase: 20% @ $5k / wafer => $425k

Modules Task List Assumptions

Production Rate Assumptions:

Modules

- Assembly: 2 production sites (ANL, LBNL)
- Test: 4 test sites (ANL, LBNL, UCSC, UNM)
- Module Assembly and test = 120 modules/3 months => 10 modules/week
  - 27 months to complete production 7/1/2020 to 9/30/2022
  - Leaves 3 months for stave loading and delivery to CERN by 12/31/2022
  - Total 1080 modules per site, 2160 total modules

Highly Accelerated Stress Screening (HASS)

- HASS Test: 1-4 test sites *TBD (OkU,….)
  - Assumed 10 (up to 40) modules / month if all modules are tested
  - One test batch (1-5?) modules takes 1 day, currently tests done 1 module at a time
  - Only OkU task list currently includes HASS testing

Modules Task List Assumptions

Details:

- WORKDAY function was used to calculate end date based on start date and the number of work days
- Workdays do not reflect FTE involvement
- Tasks mainly done by scientific staff are included when it is assumed some technical support may be involved in the activity—highlighted in light blue
- Tasks done completely by scientific staff are highlighted in dark gray
  - Tasks were kept to aid understanding of dependencies—can easily be removed
- UIUC, UW, Wisconsin all have travel support to aid in testing at production sites
  - Relevant tasks were copied from production site and modified to read 'support for X activity at X site'

Modules Deliverables

Deliverable Items:

Modules
- 4? HALT test stands with HASS Q&A procedures by OkU
- (~200 Quad flex cables for readout tests, not in budget $20k each for RD53A/B modules)
- 4? Module test stands by ANL
  - not currently in budget to deliver, each institute has funds to 'buy' their own
- 2000 modules
  - Assembled, tested, and HASS tested

FE Chip
- YARR (yet another rapid readout) system development by LBNL,UW
- 10 YARR readout systems produced $30k (not in budget) by LBNL
- RD53A design by LBNL
- 20% of RD53A production $75k at LBNL
- RD53B design by LBNL
- 20% of RD53B production $260k in FY19 (funds currently allocated in FY21) at LBNL
- 20% of RD53B_final FE chip production $390k in FY20 at LBNL
- 140 wafers tested, 33% of wafer testing at LBNL

Modules Task List Status

(some) Funding discrepancies:

ANL

- Add $20k for RD53A quad module flex FY17 ($15k engineering labor and $5k M&S)
- Add $20k for RD53B quad module flex FY19 ($15k engineering labor and $5k M&S)

LBNL

- RD53B submission funds need to moved from FY21 to FY19 $260k at LBNL
- $30k needs to be added for YARR production in FY19
- $390k for final chip submission may be short
    - rough estimate $425k, but can probably be compensated with FY19 production funds

OkU

- $57k M&S listed for FY18 and FY19, but needs to be shifted up one year to FY17 for HALT test setup development and FY18 for HALT/HASS production

General

- Are we planning to include bump-bonding expense?? Nothing is currently in WBS or task lists